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SAR Test Report

Report Number: M140227FR

This report is a replacement for Report No. M140227F

Test Sample: Tait Push to Talk Transceiver

Type: TPDH7A

FCC ID: CASTPDH7A
IC ID: 737A-TPDH7A

Tested For: TAIT Limited

Date of Issue: 4th June 2014

CONTENTS

SAR EVALUATION

Tait Push to Talk Transceiver, **Type:** TPDH7A **Report Number:** M140227FR

1.0 GENERAL INFORMATION

Test Sample:		Tait Push to Talk Transceiver
Type:		TPDH7A
Serial	**16-Key**	25543015
Number:	**4-Key**	25543020
FCC ID:		CASTPDH7A
IC ID:		737A-TPDH7A
Hardware Version:		TPDB1X-H700_0006
Software Version:		QPD1B_S00_3.00.03.0001
Manufacturer:		Tait Limited
Device Category:		Portable Transmitter
Test Device:		Production Unit / Prototype Sample
RF exposure Category:		Occupational/Aware user
Tested for:		Tait Limited
Address:		558 Wairakei Road Christchurch 8140 New Zealand
Contact:		Marcus Ludwing
Phone:		+64-3-357 0805
Fax:		+64-3-359 4632
Email:		marcus.ludwig@taitradio.com

Test Standard/s:

447498 D01 General RF Exposure Guidance v05r02
643646 D01 SAR Test for PTT Radios v01r01
865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
865664 D02 RF Exposure Reporting v01r01
Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
RSS-102 Issue 4
IEC 62209-1:2006 and IEC 62209-2:2010
Human exposure to radio frequency fields from hand-held and body-mounted devices-Human models, instrumentation and procedures.
Part 1: Procedure to determine the specific absorption rate (SAR) for hand- held devices used in close proximity to the ear (frequency range 300 MHz to 3 GHz)
Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz

IEEE 1528: 2013 Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Statement Of Compliance: The Tait Push to Talk Transceiver, Type TPDH7A. Complied with the FCC Occupational/controlled RF exposure limits of 8.0mW/g per requirements of 47CFR2.1093(d). It also complied with IC RSS-102 requirements.

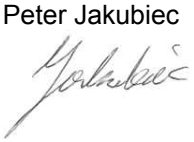
Highest Reported SAR: 450 MHz Band – 5.94 mW/g

Test Dates: 24th March 2014 till 1st April 2014

Test Officer:

Peter Jakubiec

Authorised Signature:



Peter Jakubiec

2.0 DESCRIPTION OF DEVICE

2.1 Description of Test Sample

The device tested was a Tait Push to Talk Transceiver, Type: TPDH7A operating in 450 MHz frequency band. It will be referred to as the device under test (DUT) throughout this report. The DUT has an external integral fixed length antenna and was tested in the Face Frontal and Belt Clip configurations of the phantom. There are two variants of the DUT available, one with 4 keys and one with 16 keys present on the outer case. The differences in construction are limited to the presence or lack thereof of some of the plastic keys, (i.e. the PCB and other internal electronics are identical). SAR testing was conducted on the 16-Key variant. Some SAR testing was done on the 4-key variant to confirm the SAR distribution is the same for both variants.

Operating Mode during Testing	: Continuous Wave 100% duty cycle
Operating Mode production sample	: 50% duty cycle
Modulation:	: FM
Device Power Rating for test sample and identical production unit	: 4 W
Device Dimensions (LxWxH)	: 137 x 60 x 32 mm
Antenna type	: Helical and Whip
Applicable Head Configurations	: Face Frontal
Applicable Body Configurations	: Belt Clip Position
Battery Options	: 7.4V 1880mAh Low Capacity Li-Ion Battery Pack : 7.4V 2400mAh High Capacity Li-ion Battery Pack

2.2 Test sample Accessories

The radios are not shipped with any particular default battery or accessory. It is up to the customer to choose the combination of batteries and accessories which best fits the intended the use for the radio. See section 7.2 for an explanation of how the default accessories were selected for the purposes of testing to KDB643646.

2.2.1 Battery Types

Both 7.4 V 2400 mAh Li-ion and 7.4V 1880mAh Li-ion Battery packs are used to power the DUT. SAR measurements were performed with both 7.4 V battery packs.

2.2.2 Antenna Description and Characteristics

The device was supplied with two sizes/types of antennas each to cover the full operating frequency range

Product Code	Type	Antenna Length (mm)	Report Reference	Frequency Range
TPA-AN-012	Whip	130	Wide	450-520 MHz
TPA-AN-015	Helical	65	Wide	450-520 MHz

2.2.3 Body Worn Accessories

Number of body worn accessories containing small metallic parts is sold with the DUT, which are listed in the table below. All of the listed accessories can be used in any combination of battery mentioned in section 2.2.1 above and any Audio Accessory mentioned in section 2.2.4 below.

Body Worn Accessory	Part Number	Spacing between the phantom and the back of the DUT
Battery Clip	TPA-CA-201	14 mm
Nylon Case with Battery Clip	T03-00038-0018 with TPA-CA-201	14 mm
Nylon Case Belt Loop	T03-00038-0017	7 mm
Nylon Case D-Stud with D-Stud Spring Clip	T03-00038-0016 with T03-00038-0023	31mm
Nylon Case D-Stud with D-Stud Belt Loop	T03-00038-0016 with T03-00038-0022	42mm
Soft Leather Case with Battery Clip	T03-00038-0021 with TPA-CA-201	14mm
Leather Case with Spring Clip	T03-00038-0005	17 mm
Leather Case with D-Stud Spring Clip	T03-00038-0007 with T03-00038-0023	31mm
Leather Case with D-Stud Belt Loop	T03-00038-0007 with T03-00038-0022	42mm
Leather Case Belt Loop	T03-00038-0009	10 mm

2.2.4 Audio Accessories

There are seven audio accessories available for DUT:
According to KDB643646 publication ”For audio accessories with similar construction and operating requirements, test only the audio accessory within the group that is expected to result in the highest SAR, with respect to changes in RF characteristics and exposure conditions for the combination. If it is unclear which audio accessory within a group of similar accessories is expected to result in the highest SAR, good engineering judgment and preliminary testing should be applied to select the accessory that is expected to result in the highest SAR.”
For the Speaker – Microphone group T03-00045-BFAA audio accessory was chosen which represents typical accessory of this type, there is very minor difference in connector/cable assembly between T03-00045-BFAA and other Speaker – Microphones. For Headset-Microphone and for Earphone-Microphone combined audio accessory group, two representative models were chosen based on the connector and cable shape and size - T03-00046-FAAA and T03-00046-FEAA, the other two accessories of this group have very similar construction respectively.

Audio Accessory	Part Number
Speaker- Microphone	T03-00045-CFAA
Speaker- Microphone	T03-00045-DMAA
Speaker- Microphone	T03-00045-BFAA
Headset-Microphone	T03-00046-FAAA
Headset-Microphone	T03-00046-FEAA
Earphone-Microphone	T03-00047-CBAA
Earphone-Microphone	T03-00047-BAAA

2.3 Test Signal, Frequency and Output Power

The DUT is operating in the 450 MHz frequency band. The frequency range is 450 MHz to 512 MHz. The transmitter was configured into a test mode that ensured a continuous RF transmission for the duration of each SAR scan. The device transmission characteristics were also monitored during testing to confirm the device was transmitting continuously. FCC guidelines (KDB 643646 and a device specific KDB) were followed to determine the required SAR testing configurations. The device has an audio accessory output to which a supplied hands free speaker/microphone was connected during all testing in the body positions. Excluding the audio accessory there were no wires or other connections to the DUT during the SAR measurements.

Table: Test Frequencies

Frequency Range	Traffic Channels	Nominal Power (dBm)
450-512 MHz	1-7	36.02

2.4 Conducted Power Measurements

The conducted power of the DUT was measured in the 450 MHz to 520 MHz frequency range with a calibrated Power Meter. The results of this measurement are listed in table below.

Table: Frequency and Output Power

Channel	Channel Frequency MHz	Battery Type	Maximum Conducted Output Power dBm
1	450.000	Li-ion	36.175
2	467.500	Li-ion	36.205
3	485.000	Li-ion	36.235
4	502.500	Li-ion	36.165
5	512.000	Li-ion	36.214
6	459.900	Li-ion	36.190
7	469.900	Li-ion	36.180

2.5 Battery Status

The device battery was fully charged prior to commencement of measurement. Each SAR test was completed within 30 minutes. The battery condition was monitored by measuring the RF power at a defined position inside the phantom before the commencement of each test and again after the completion of the test, additionally by measuring the conducted RF at the antenna port before the commencement of each test and again after the completion of the test.

Table: Battery Details

Battery #1:	Low Capacity Li-ion 7.4V 14Wh 1880mAh	**Battery #2:**	High Capacity Li-ion 7.4V 18Wh 2400mAh
Model No.:	T03-00011-AAAA	**Model No.:**	T03-00011-CAAA
Serial No.:	25368789	**Serial No.:**	25371663

2.6 Details of Test Laboratory

2.6.1 Location

EMC Technologies Pty Ltd
176 Harrick Road
Keilor Park, (Melbourne) Victoria
Australia 3042

Telephone: +61 3 9365 1000
Facsimile: +61 3 9331 7455
email: melb@emctech.com.au
website: www.emctech.com.au

2.6.2 Accreditations

EMC Technologies Pty. Ltd. is accredited by the National Association of Testing Authorities, Australia (NATA). **NATA Accredited Laboratory Number: 5292**

EMC Technologies Pty Ltd is NATA accredited for the following standards:

AS/NZS 2772.2:2011	RF and microwave radiation hazard measurement
ACMA:	Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
FCC:	FCC Knowledge Database KDB measurement procedures
EN 50360: 2001	Product standard to demonstrate the compliance of mobile phones with the basic restrictions related to human exposure to electromagnetic fields (300 MHz – 3 GHz)
EN 62209-1:2006	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures. **Part 1:** Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (300 MHz to 3 GHz)
EN 62209-2:2010	Human Exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models instrumentation and procedures **Part 2:** Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz
IEEE 1528: 2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head Due to Wireless Communications Devices: Measurement Techniques.

Refer to NATA website www.nata.asn.au for the full scope of accreditation.

2.6.3 Environmental Factors

The measurements were performed in a shielded room with no background network signals. The temperature in the laboratory was controlled to within 21 ± 1 °C, the humidity was 45 to 56 %. The liquid parameters were measured prior to the commencement of the tests. Tests were performed to check that reflections within the environment did not influence the SAR measurements. The noise floor of the DASY5 SAR measurement system using the ET3DV6 E-field probe is less than 5μV in both air and liquid mediums.

2.7 Calibration and Validation Procedures and Data

Prior to the SAR assessment, the system validation kit was used to verify that the DASY5 was operating within its specifications. The validation was performed at 450 MHz with the SPEAG D450V3 calibrated dipole**.**

The validation dipoles are highly symmetric and matched at the centre frequency for the specified liquid and distance to the phantom. The accurate distance between the liquid surface and the dipole centre is achieved with a distance holder that snaps onto the dipole.

System validation is performed by feeding a known power level into a reference dipole, set at a known distance from the phantom. The measured SAR is compared to the theoretically derived level.

2.7.1 System Check Results @ 450 MHz

The following table lists the dielectric properties of the tissue simulating liquid measured prior to SAR System Check. The results of the System Check are listed in columns 4 and 5. The forward power into the reference dipole for each SAR System Check was adjusted to 400mW.

Table: System Check Results (Dipole: SPEAG D450V3 **SN:** 1074**)**

1. System Check Date	2. Frequency (MHz)	3. ∈r (measured)	4. σ (mho/m) (measured)	5. Measured SAR 1g	6. Measured SAR 10g	7. Last Validation Date
24th March 2014	450	56.4	0.94	1.89	1.19	12/02/2014
25th March 2014	450	55.7	0.91	1.86	1.18	12/02/2014
26th March 2014	450	55.5	0.91	1.85	1.17	12/02/2014
27th March 2014	450	55.6	0.90	1.85	1.17	12/02/2014
28th March 2014	450	55.4	0.92	1.92	1.21	12/02/2014
31st March 2014	450	55.9	0.93	1.90	1.20	12/02/2014
1st April 2014	450	42.8	0.84	1.88	1.19	12/02/2014
3rd June 2014	450	57.7	0.96	1.83	1.15	12/02/2014

2.7.2 Deviation from reference validation values

The reference SAR values are derived using a reference dipole and flat phantom suitable at the frequencies listed below. These reference SAR values are obtained from the IEEE Std 1528-2013 and are normalized to 1W.

The SPEAG calibration reference SAR value is the SAR validation result obtained in a specific dielectric liquid using the validation dipole during calibration. The measured one-gram SAR should be within 10% of the expected target reference values shown in table below.

Table: Deviation from reference validation values

Frequency and Date	Measured SAR 1g (mW/g)	Measured SAR 1g (Normalized to 1W)	SPEAG Calibration reference SAR Value 1g (mW/g)	Deviation From SPEAG (%)	IEEE Std 1528 reference SAR value 1g (mW/g)	Deviation From IEEE (%)
450MHz 24th March 2014	1.89	4.73	4.42	6.90	-	-
450MHz 25th March 2014	1.86	4.65	4.42	5.20	-	-
450MHz 26th March 2014	1.85	4.63	4.42	4.64	-	-
450MHz 27th March 2014	1.85	4.63	4.42	4.64	-	-
450MHz 28th March 2014	1.92	4.80	4.42	8.60	-	-
450MHz 31st March 2014	1.90	4.75	4.42	7.47	-	-
450MHz 1st April 2014	1.88	4.70	4.58	2.62	4.9	-4.08
450MHz 3rd June 2014	1.83	4.58	4.42	3.51	-	-

NOTE: All reference validation values are referenced to 1W input power.

2.7.3 Liquid Temperature and Humidity

The humidity and dielectric/ambient temperatures are recorded during the assessment of the tissue material dielectric parameters. The difference between the ambient temperature of the liquid during the dielectric measurement and the temperature during tests was less than |2|°C.

Table: Temperature and Humidity recorded for each day

Date	Ambient Temperature (°C)	Liquid Temperature (°C)	Humidity (%)
24th March 2014	21.7	21.3	54
25th March 2014	21.5	21.3	50
26th March 2014	21.5	21.2	50
27th March 2014	21.1	20.8	45
28th March 2014	21.2	20.7	55
31st March 2014	21.1	20.8	56
1st April 2014	21.3	20.9	52
3rd June 2014	20.5	20.3	51

3.0 SAR MEASUREMENT PROCEDURE USING DASY5

The SAR evaluation was performed with the SPEAG DASY5 system. A summary of the procedure follows:

a) A measurement of the conducted power value at the antenna port is used as a reference value for assessing the power drop of the DUT. Also a measurement of the SAR value at a fixed location is used. The power is measured at the start of the test and then again at the end of the test.

b) The SAR distribution at the exposed side of the head *or* the flat section of the flat phantom is measured at a distance of 4.0 mm from the inner surface of the shell. The area covers the entire dimension of the DUT and the horizontal grid spacing is 15 mm x 15 mm. The actual largest Area Scan has dimensions of 120 mm x 330 mm surrounding the test device. Based on this data, the area of the maximum absorption is determined by Spline interpolation.

c) Around this point, a volume of 32 mm x 32 mm x 30 mm is assessed by measuring 8 x 8 x 5 points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:

   (i) The data at the surface are extrapolated, since the centre of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 4 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.

   (ii) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the “Not a knot”- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.

   (iii) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.

   (iv) The SAR value at the same location as in Step (a) is again measured

4.0 MEASUREMENT UNCERTAINTY

The uncertainty analysis is based on the template listed in the IEEE Std 1528-2003 for both Handset SAR tests and System Check uncertainty. The measurement uncertainty of a specific device is evaluated independently and the total uncertainty for both evaluations (95% confidence level) must be less than 30%.

Table: IEEE 1528:2003 Uncertainty Budget for DASY5 Version 52 – DUT SAR test

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6.65	N	1.00	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	1.73	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	1.73	0.7	0.7	3.88	3.88	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0.8	R	1.73	1	1	0.46	0.46	∞
Integration Time	2.6	R	1.73	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	3	R	1.73	1	1	1.73	1.73	∞
Probe Positioner	0.4	R	1.73	1	1	0.23	0.23	∞
Probe Positioning	2.9	R	1.73	1	1	1.67	1.67	∞
Max. SAR Eval.	1	R	1.73	1	1	0.58	0.58	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Test Sample Related								
Power Scaling	0	R	1.73	1	1	0.00	0.00	∞
Test Sample Positioning	2.9	N	1.00	1	1	2.90	2.90	145
Device Holder Uncertainty	3.6	N	1.00	1	1	3.60	3.60	5
Output Power Variation – SAR Drift Measurement	4.72	R	1.73	1	1	2.73	2.73	∞
Phantom and Setup								
Phantom Uncertainty	7.5	R	1.73	1	1	4.33	4.33	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.71	1.60	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.6	0.26	1.50	0.65	∞
Temp.unc. - Conductivity	1.7	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.3	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						12.0	11.8	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			23.9	23.6	

Estimated total measurement uncertainty for the DASY5 measurement system was ±12.0%. The extended uncertainty (K = 2) was assessed to be ±23.9% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table: IEC62209-2 Uncertainty Budget (With Correction Formula) for DASY5 Version 52 – DUT SAR test

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6.65	N	1	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	1.73	0.7	0.7	1.90	1.90	∞
Hemispherical Isotropy	9.6	R	1.73	0.7	0.7	3.88	3.88	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
Modulation Response	2.4	R	1.73	1	1	1.39	1.39	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0.8	R	1.73	1	1	0.46	0.46	∞
Integration Time	2.6	R	1.73	1	1	1.50	1.50	∞
RF Ambient Noise	3	R	1.73	1	1	1.73	1.73	∞
RF Ambient Reflections	3	R	1.73	1	1	1.73	1.73	∞
Probe Positioner	0.4	R	1.73	1	1	0.23	0.23	∞
Probe Positioning	2.9	R	1.73	1	1	1.67	1.67	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Test Sample Related								
Device Holder	3.6	N	1.00	1	1	3.60	3.60	5
Test Sample Positioning	2.9	N	1.00	1	1	2.90	2.90	145
Power Scaling	0	R	1.73	1	1	0.00	0.00	∞
Power Drift	4.72	R	1.73	1	1	2.73	2.73	∞
Phantom and Setup								
Phantom Uncertainty	7.5	R	1.73	1	1	4.33	4.33	∞
SAR Correction	1.9	R	1.73	1	0.84	1.10	0.92	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.64	0.43	1.60	1.08	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.26	0.26	0.65	0.65	∞
Temp.unc. - Conductivity	1.7	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.3	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						11.7	11.7	748
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			23.5	23.3	

Estimated total measurement uncertainty for the DASY5 measurement system was ±11.7%. The extended uncertainty (K = 2) was assessed to be ±23.5% based on 95% confidence level. The uncertainty is not added to the measurement result.

Table: IEEE 1528:2003 Uncertainty Budget for DASY5 Version 52- System Check

Error Description	Uncert. Value	Prob. Dist.	Div.	C_i (1g)	C_i (10g)	1g u_i	10g u_i	v_i
Measurement System								
Probe Calibration	6.65	N	1.00	1	1	6.65	6.65	∞
Axial Isotropy	4.7	R	1.73	1	1	2.71	2.71	∞
Hemispherical Isotropy	9.6	R	1.73	0	0	0.00	0.00	∞
Boundary Effects	1	R	1.73	1	1	0.58	0.58	∞
Linearity	4.7	R	1.73	1	1	2.71	2.71	∞
System Detection Limits	1	R	1.73	1	1	0.58	0.58	∞
Readout Electronics	0.3	N	1.00	1	1	0.30	0.30	∞
Response Time	0	R	1.73	1	1	0.00	0.00	∞
Integration Time	0	R	1.73	1	1	0.00	0.00	∞
RF Ambient Noise	1	R	1.73	1	1	0.58	0.58	∞
RF Ambient Reflections	1	R	1.73	1	1	0.58	0.58	∞
Probe Positioner	0.8	R	1.73	1	1	0.46	0.46	∞
Probe Positioning	6.7	R	1.73	1	1	3.87	3.87	∞
Max. SAR Eval.	2	R	1.73	1	1	1.15	1.15	∞
Post Processing	2	R	1.73	1	1	1.15	1.15	∞
Dipole Related								
Deviation of exp. dipole	5.5	R	1.73	1	1	3.18	3.18	∞
Dipole Axis to Liquid Dist.	2	R	1.73	1	1	1.15	1.15	∞
Input power & SAR drift	4.72	R	1.73	1	1	2.73	2.73	∞
Phantom and Setup								
Phantom Uncertainty	4	R	1.73	1	1	2.31	2.31	∞
Liquid Conductivity – Deviation from target values	5	R	1.73	0.64	0.43	1.85	1.24	∞
Liquid Permittivity – Deviation from target values	5	R	1.73	0.6	0.49	1.73	1.41	∞
Liquid Conductivity – Measurement uncertainty	2.5	N	1.00	0.78	0.71	1.95	1.78	∞
Liquid Permittivity – Measurement uncertainty	2.5	N	1.00	0.26	0.26	0.65	0.65	∞
Temp.unc. - Conductivity	1.7	R	1.73	0.78	0.71	0.77	0.70	∞
Temp. unc. - Permittivity	0.3	R	1.73	0.23	0.26	0.04	0.05	∞
Combined standard Uncertainty (u_c)						10.7	10.5	
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k= 2			21.3	21.0	

Estimated total measurement uncertainty for the DASY5 measurement system was ±10.7%. The extended uncertainty (K = 2) was assessed to be ±21.3% based on 95% confidence level. The uncertainty is not added to the System Check measurement result.

5.0 EQUIPMENT LIST AND CALIBRATION DETAILS

Table: SPEAG DASY5 Version 52

Equipment Type	Manufacturer	Model Number	Serial Number	Calibration Due	Used For this Test?
Robot - Six Axes	Staubli	RX90BL	N/A	Not applicable	✓
Robot Remote Control	SPEAG	CS7MB	RX90B	Not applicable	✓
SAM Phantom	SPEAG	N/A	1260	Not applicable	
SAM Phantom	SPEAG	N/A	1060	Not applicable	
Flat Phantom	AndreT	10.1	P 10.1	Not Applicable	
Flat Phantom	AndreT	9.1	P 9.1	Not Applicable	
Flat Phantom	SPEAG	ELI 4.0	1101	Not Applicable	✓
Data Acquisition Electronics	SPEAG	DAE3 V1	359	03-June-2014	
Data Acquisition Electronics	SPEAG	DAE3 V1	442	10-Dec-2014	✓
Probe E-Field - Dummy	SPEAG	DP1	N/A	Not applicable	
Probe E-Field	SPEAG	ET3DV6	1380	13-Dec-2014	✓
Probe E-Field	SPEAG	ET3DV6	1377	14-June-2014	
Probe E-Field	SPEAG	ES3DV6	3029	Not Used	
Probe E-Field	SPEAG	EX3DV4	3956	04-Nov-2014	
Probe E-Field	SPEAG	EX3DV4	3657	17-Dec-2014	
Validation Source 150 MHz	SPEAG	CLA150	4003	3-Dec-2015	
Antenna Dipole 300 MHz	SPEAG	D300V3	1012	11-Dec-2014	
Antenna Dipole 450 MHz	SPEAG	D450V3	1074	11-Dec-2014	✓
Antenna Dipole 750 MHz	SPEAG	D750V2	1051	13-Dec-2015	
Antenna Dipole 900 MHz	SPEAG	D900V2	047	22-June-2014	
Antenna Dipole 1640 MHz	SPEAG	D1640V2	314	20-June-2014	
Antenna Dipole 1800 MHz	SPEAG	D1800V2	242	20-June-2014	
Antenna Dipole 1950 MHz	SPEAG	D1950V3	1113	6-Dec -2014	
Antenna Dipole 2300 MHz	SPEAG	D2300V2	1032	22-Aug-2015	
Antenna Dipole 2450 MHz	SPEAG	D2450V2	724	04-Dec-2014	
Antenna Dipole 2600 MHz	SPEAG	D2600V2	1044	13-Dec-2015	
Antenna Dipole 3500 MHz	SPEAG	D3500V2	1002	13-July-2013	
Antenna Dipole 5600 MHz	SPEAG	D5GHzV2	1008	16-Dec-2015	
RF Amplifier	EIN	603L	N/A	*In test	✓
RF Amplifier	Mini-Circuits	ZHL-42	N/A	*In test	
RF Amplifier	Mini-Circuits	ZVE-8G	N/A	*In test	
Synthesized signal generator	Hewlett Packard	ESG-D3000A	GB37420238	*In test	✓
RF Power Meter	Hewlett Packard	437B	3125012786	28-Aug-2014	✓
RF Power Sensor 0.01 - 18 GHz	Hewlett Packard	8481H	1545A01634	29-Aug-2014	✓
RF Power Meter	Rohde & Schwarz	NRP	101415	18-Sept-2014	
RF Power Sensor	Rohde & Schwarz	NRP - Z81	100174	18-Sept-2014	
RF Power Meter Dual	Hewlett Packard	435A	1733A05847	*In test	✓
RF Power Sensor	Hewlett Packard	8482A	2349A10114	*In test	✓
Network Analyser	Hewlett Packard	8714B	GB3510035	25-Sept-2014	
Network Analyser	Hewlett Packard	8753ES	JP39240130	6-Nov-2014	✓
Dual Directional Coupler	Hewlett Packard	778D	1144 04700	*In test	✓
Dual Directional Coupler	NARDA	3022	75453	*In test	

* Calibrated during the test for the relevant parameters.

6.0 SAR TEST METHOD

6.1 Description of the Test Positions (Face Frontal and Belt Clip)

SAR measurements were performed in the “Face Frontal” and “Belt Clip” positions. Both the “Face Frontal” and “Belt Clip” positions were measured in the flat section of the SPEAG ELI 4.0 phantom. See Appendix A for photos of test positions.

6.1.1 “Face Frontal Position”

The SAR evaluation was performed in the flat section of the SPEAG phantom. The device was placed 25mm from the phantom, this position is equivalent to the device placed in front of the nose. The supporting hand was not used.

6.1.2 “Belt Clip” Position

The device was tested in the (2.00 mm) flat section of the SPEAG phantom for the “Belt Clip” position. Various belt clip accessories were assessed (see section 2.2.3 for a list of the body worn accessories). The Transceiver was placed at the flat section of the phantom and suspended until the Belt Clip/Belt Loop touched the phantom. The belt clips/loops contained metal parts and the device was connected with the hands free earpiece/microphone.

6.2 List of All Test Cases (Antenna In/Out, Test Frequencies, User Modes)

There are two radio options, two antenna options, seven audio accessory options, two battery options and ten combinations of body worn accessories, for a total of 560 possible body configurations and 8 possible head configurations. The test configurations chosen were according to KDB 643646 and a device specific KDB. There is no default battery or audio accessory defined by the manufacturer for the DUT. The chosen defaults in accordance with KDB 643646 are as follows:

- Default battery for the head positions was the high capacity battery, as it may be capable of delivering more current to the amplifier.
- Default battery for the body positions was the low capacity battery, as it provides the least amount of spacing between the transmitting antenna and the phantom.
- Default audio accessory for the body positions was the speaker microphone (“BFAA”), because the coiled cable was expected to re-radiate energy over a smaller area.
- There is no default body worn accessory supplied with the radio, and all combinations of body worn accessories were assessed.

The 4-key and 16-key variants of the radio are expected to produce the same SAR due to only minor variances in construction. Selected worst case configurations of the 16-Key variant were repeated with the 4-Key variant to confirm this.

Only one antenna can be used at a time. Only one audio accessory can be used at a time. Only one battery option can be used at a time. Some body worn accessories are only designed to be used in conjunction with other body worn accessories, and some can be used on their own. The various combinations of body worn accessories available are labelled A – J below. Any combination of body worn accessories can be used with any antenna, any audio accessory and any battery.

Table: Body Accessory Combinations

	Not Combined	Battery Clip	D-Stud Spring Clip	D-Stud Belt Loop
Battery		A		
Nylon Case		B		
Nylon Case Belt Loop	C			
Nylon Case			D	
Nylon Case				E
Soft Leather Case		F		
Leather Case with Spring Clip	G			
Leather Case			H	
Leather Case				I
Leather Case Belt Loop	J			

Applicable Duty Cycle for PTT Radios
KDB 447498 D01 v05 states that the RF exposure of a PTT device should be evaluated with a 50% duty cycle, if the actual duty cycle is <50%. The DUT operates in a half-duplex mode, and is only transmitting while a mechanical PTT button is pressed. This is true for all modes of operation, including PABX/PSTN modes. The PTT button must be released periodically to facilitate two way communication, and during real world use the actual duty cycle would be much lower than 50%. The results in section 8.0 have been scaled to a 50% duty cycle, in accordance with KDB 447498.

6.3 FCC RF Exposure Limits for Occupational/ Controlled Exposure

Spatial Peak SAR Limits For:	
Partial-Body:	8.0 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	20.0 mW/g (averaged over 10g cube of tissue)

6.4 FCC RF Exposure Limits for Un-controlled/Non–occupational

Spatial Peak SAR Limits For:	
Partial-Body:	1.6 mW/g (averaged over any 1g cube of tissue)
Hands, Wrists, Feet and Ankles:	4.0 mW/g (averaged over 10g cube of tissue)

7.0 SAR MEASUREMENT RESULTS

The SAR values averaged over 1 g tissue mass were determined for the sample device for the Face Frontal and Belt Clip configurations of the phantom.

7.1 SAR Measurement Results Body

Table: SAR MEASUREMENT RESULTS – Body Worn positions Antenna Whip

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Battery Clip 16 Key 24-03-14	1.	CW	1	450.1	8.09	4.05	0.06	56.36	0.9374	36.22
Body Battery Clip 16 Key 24-03-14	2.	CW	2	465.5	8.74	4.37	-0.18	56.06	0.9448	36.24
Body Battery Clip 16 Key 24-03-14	3.	CW	3	481	10.10	5.05	-0.14	55.76	0.9512	36.25
Body Battery Clip 16 Key 24-03-14	4.	CW	4	496.5	9.44	4.72	-0.18	55.43	0.9572	36.21
Body Battery Clip 16 Key 24-03-14	5.	CW	5	511.9	6.10	3.05	-0.2	55.16	0.9638	36.24
Body Nylon Case Battery Clip 16 Key 24-03-14	6.	CW	1	450.1	9.34	4.67	-0.19	56.36	0.9374	36.24
Body Nylon Case Battery Clip 16 Key 24-03-14	7.	CW	2	465.5	9.18	4.59	-0.09	56.06	0.9448	36.24
Body Nylon Case Battery Clip 16 Key 24-03-14	8.	CW	3	481	10.9	5.45	-0.18	55.76	0.9512	36.24
Body Nylon Case Battery Clip 16 Key 24-03-14	9.	CW	4	496.5	10.3	5.15	-0.14	55.43	0.9572	36.21

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Nylon Case Battery Clip 16 Key 24-03-14	10.	CW	5	511.9	7.96	3.98	-0.18	55.16	0.9638	36.23
Body Nylon Case Belt Loop 16 Key 25-03-14	11.	CW	1	450.1	8.37	4.19	-0.19	55.71	0.9086	36.23
Body Nylon Case Belt Loop 16 Key 25-03-14	12.	CW	2	465.5	10.2	5.10	-0.12	55.47	0.9197	36.25
Body Nylon Case Belt Loop 16 Key 25-03-14	13.	CW	3	481	11.3	5.65	-0.09	55.19	0.9309	36.27
Body Nylon Case Belt Loop 16 Key 25-03-14	14.	CW	4	496.5	10.3	5.15	0.00	54.89	0.9417	36.22
Body Nylon Case Belt Loop 16 Key 25-03-14	15.	CW	5	511.9	7.52	3.76	-0.17	54.59	0.9539	36.20
Body Nylon Case Belt Loop 16 Key 03-06-14	16.	CW	6	459.9	10.9	5.45	-0.1	57.57	0.9689	36.22
Body Nylon Case Belt Loop 16 Key 03-06-14	17.	CW	7	469.9	10.4	5.20	-0.04	57.43	0.98	36.20
Body Nylon Case D-Stud Spring Clip 16 Key 25-03-14	18.	CW	3	481	7.93	3.97	-0.21	55.19	0.9309	36.26
Body Nylon Case D-Stud Belt Loop 16 Key 25-03-14	19.	CW	3	481	4.37	2.185	-0.12	55.19	0.9309	36.27
Body Soft Leather Case Battery Clip 16 Key 25-03-14	20.	CW	1	450.1	9.81	4.91	0.01	55.71	0.9086	36.21

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Soft Leather Case Battery Clip 16 Key 25-03-14	21.	CW	2	465.5	9.07	4.54	-0.19	55.47	0.9197	36.23
Body Soft Leather Case Battery Clip 16 Key 25-03-14	22.	CW	3	481	9.77	4.89	-0.18	55.19	0.9309	36.25
Body Soft Leather Case Battery Clip 16 Key 25-03-14	23.	CW	4	496.5	10.2	5.10	-0.19	54.89	0.9417	36.23
Body Soft Leather Case Battery Clip 16 Key 25-03-14	24.	CW	5	511.9	7.80	3.90	-0.18	54.59	0.9539	36.21
Body Leather Case Spring Clip 16 Key 26-03-14	25.	CW	1	450.1	8.87	4.44	-0.08	55.71	0.9086	36.28
Body Leather Case Spring Clip 16 Key 26-03-14	26.	CW	2	465.5	8.60	4.30	-0.18	55.47	0.9197	36.25
Body Leather Case Spring Clip 16 Key 26-03-14	27.	CW	3	481	8.87	4.44	-0.15	55.19	0.9309	36.21
Body Leather Case Spring Clip 16 Key 26-03-14	28.	CW	4	496.5	10.30	5.15	-0.21	54.89	0.9417	36.22
Body Leather Case Spring Clip 16 Key 26-03-14	29.	CW	5	511.9	7.63	3.82	-0.1	54.59	0.9539	36.24
Body Leather Case D-Stud Spring Clip 16 Key 26-03-14	30.	CW	3	481	6.39	3.20	-0.15	55.19	0.9309	36.27
Body Leather Case D-Stud Belt Loop 16 Key 26-03-14	31.	CW	3	481	3.36	1.68	-0.07	55.19	0.9309	36.26

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Leather Case Belt Loop 16 Key 26-03-14	32.	CW	2	465.5	7.72	3.86	-0.13	55.47	0.9197	36.25
Body Leather Case Belt Loop 16 Key 26-03-14	33.	CW	3	481	8.59	4.30	-0.21	55.19	0.9309	36.27
Body Leather Case Belt Loop 16 Key 26-03-14	34.	CW	4	496.5	8.47	4.24	-0.17	54.89	0.9417	36.21
Body Leather Case Belt Loop 16 Key 26-03-14	35.	CW	5	511.9	5.72	2.86	-0.18	54.59	0.9539	36.23
Body Nylon Case Belt Loop Extended Battery 16 Key 26-03-14**	36.	CW	3	481	9.26	4.63	-0.18	55.19	0.9309	36.28
Body Nylon Case Belt Loop Audio Accessory FAAA 16 Key 26-03-14	37.	CW	3	481	10.9	5.45	-0.14	55.19	0.9309	36.26
Body Nylon Case Belt Loop Audio Accessory FEAA 16 Key 26-03-14	38.	CW	3	481	9.61	4.81	-0.07	55.19	0.9309	36.27
Body Nylon Case Belt Loop 4-key Variant 31-03-14	39.	CW	1	450.1	10.9	5.45	-0.21	55.94	0.9261	36.24
Body Nylon Case Belt Loop 16-key Variability 31-03-14	40.	CW	3	481	10.9	5.45	-0.08	55.45	0.9506	36.22
System Check 24-03-14	41.	CW 450 MHz	1	450	1.89	N/A	-0.02	56.36	0.9374	-
System Check 25-03-14	42.	CW 450 MHz	1	450	1.86	N/A	-0.02	55.71	0.9086	-

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
System Check 26-03-14	43.	CW 450 MHz	1	450	1.85	N/A	-0.03	55.49	0.9193	-
System Check 03-06-14	44.	CW 450 MHz	1	450	1.83	N/A	-0.01	57.68	0.96	-

Note: The uncertainty of the system (± 23.9 %) has not been added to the results.
***High capacity battery option used*
The FCC SAR limit for occupational exposure is 8.0mW/g measured in a 1g cube of tissue.

Table: SAR MEASUREMENT RESULTS – Body Worn positions Antenna Helical

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Battery Clip 16 Key 27-03-14	45.	CW	1	450.1	9.86	4.93	-0.03	55.57	0.8955	36.28
Body Battery Clip 16 Key 27-03-14	46.	CW	2	465.5	8.63	4.32	-0.13	55.35	0.9088	36.25
Body Battery Clip 16 Key 27-03-14	47.	CW	3	481	9.29	4.65	-0.18	55.12	0.9222	36.29
Body Battery Clip 16 Key 27-03-14	48.	CW	4	496.5	6.09	3.05	-0.02	54.84	0.9357	36.25
Body Nylon Case Battery Clip 16 Key 27-03-14	49.	CW	1	450.1	10.2	5.10	0.01	55.57	0.8955	36.22
Body Nylon Case Battery Clip 16 Key 27-03-14	50.	CW	2	465.5	9.11	4.56	-0.15	55.35	0.9088	36.25
Body Nylon Case Battery Clip 16 Key 27-03-14	51.	CW	3	481	9.67	4.84	-0.10	55.12	0.9222	36.27
Body Nylon Case Battery Clip 16 Key 27-03-14	52.	CW	4	496.5	5.9	2.95	-0.12	54.84	0.9357	36.25
Body Nylon Case Belt Loop 16 Key 27-03-14	53.	CW	1	450.1	11.3	5.65	-0.02	55.57	0.8955	36.23
Body Nylon Case Belt Loop 16 Key 27-03-14	54.	CW	2	465.5	9.88	4.94	-0.16	55.35	0.9088	36.24
Body Nylon Case Belt Loop 16 Key 27-03-14	55.	CW	3	481	9.00	4.50	-0.17	55.12	0.9222	36.27

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Nylon Case Belt Loop 16 Key 27-03-14	56.	CW	4	496.5	5.80	2.90	-0.15	54.84	0.9357	36.21
Body Nylon Case Belt Loop 16 Key 03-06-14	57.	CW	6	459.9	9.37	4.69	0.12	57.57	0.9689	36.23
Body Nylon Case Belt Loop 16 Key 03-06-14	58.	CW	7	469.9	11.1	5.55	-0.01	57.43	0.98	36.19
Body Nylon Case D-Stud Spring Clip 16 Key 28-03-14	59.	CW	3	481	7.00	3.50	-0.19	55.01	0.9473	36.26
Body Nylon Case D-Stud Belt Loop 16 Key 28-03-14	60.	CW	3	481	3.56	1.78	-0.08	55.01	0.9473	36.28
Body Soft Leather Case Battery Clip 16 Key 28-03-14	61.	CW	1	450.1	10.3	5.15	-0.18	55.43	0.9219	36.21
Body Soft Leather Case Battery Clip 16 Key 28-03-14	62.	CW	2	465.5	9.37	4.69	-0.16	55.28	0.9351	36.25
Body Soft Leather Case Battery Clip 16 Key 28-03-14	63.	CW	3	481	9.31	4.66	0.05	55.01	0.9473	36.27
Body Soft Leather Case Battery Clip 16 Key 28-03-14	64.	CW	4	496.5	6.05	3.03	-0.12	54.73	0.9614	36.27
Body Leather Case Spring Clip 16 Key 28-03-14	65.	CW	1	450.1	9.43	4.72	-0.02	55.43	0.9219	36.22
Body Leather Case Spring Clip 16 Key 28-03-14	66.	CW	2	465.5	8.34	4.17	-0.16	55.28	0.9351	36.25

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
Body Leather Case Spring Clip 16 Key 28-03-14	67.	CW	3	481	9.16	4.58	-0.08	55.01	0.9473	36.28
Body Leather Case Spring Clip 16 Key 28-03-14	68.	CW	4	496.5	5.75	2.79	-0.17	54.73	0.9614	36.26
Body Leather Case D-Stud Spring Clip 16 Key 28-03-14	69.	CW	3	481	5.63	2.82	0.02	55.01	0.9473	36.28
Body Leather Case D-Stud Belt Loop 16 Key 28-03-14	70.	CW	3	481	2.91	1.46	0.00	55.01	0.9473	36.27
Body Leather Case Belt Loop 16 Key 28-03-14	71.	CW	3	481	6.68	3.34	0.03	55.01	0.9473	36.26
Body Nylon Case Belt Loop Extended Battery 16 Key 31-03-14**	72.	CW	1	450.1	9.09	4.55	-0.07	55.94	0.9261	36.28
Body Nylon Case Belt Loop FAAA Audio Accessory 16 Key 31-03-14	73.	CW	1	450.1	9.41	4.71	-0.14	55.94	0.9261	36.26
Body Nylon Case Belt Loop FEAA Audio Accessory 16 Key 31-03-14	74.	CW	1	450.1	11.00	5.50	-0.15	55.94	0.9261	36.27
Body Nylon Case Belt Loop 4-key Variant 16 Key 31-03-14	75.	CW	1	450.1	10.3	5.15	0.03	55.94	0.9261	36.22
Body Nylon Case Belt Loop 16-key Variability 31-03-14	76.	CW (0)	1	450.1	**11.8**	**5.90**	-0.08	55.94	0.9261	36.27
System Check 27-03-14	77.	CW 450 MHz	1	450	1.85	N/A	0.20	55.57	0.8955	-

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 56.7 ±5% (53.9–59.5)	σ (target 0.94 ±5% (0.89–0.99)	Measured RF Power (dBm)
System Check 28-03-14	78.	CW 450 MHz	1	450	1.92	N/A	-0.01	55.43	0.9219	-
System Check 31-03-14	79.	CW 450 MHz	1	450	1.90	N/A	-0.03	55.94	0.9261	-

Note: The uncertainty of the system (± 23.9 %) has not been added to the results.
***High capacity battery option used*
The FCC SAR limit for occupational exposure is 8.0mW/g measured in a 1g cube of tissue.

7.2 SAR Measurement Results Head

Table: SAR MEASUREMENT RESULTS – Face frontal positions Antenna Whip

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 43.5 ±5% 41.3 to 45.7)	σ (target 0.87 ±5% 0.83 to 0.91)	Measured RF Power (dBm)
Head Face Frontal 16 Key 01-04-14	80.	CW	1	450	5.66	2.83	-0.08	42.76	0.8418	36.21
Head Face Frontal 16 Key 01-04-14	81.	CW	2	467.5	6.23	3.12	-0.13	42.36	0.8566	36.24
Head Face Frontal 16 Key 01-04-14	82.	CW	3	485	6.22	3.11	-0.12	42.02	0.8712	36.27
Head Face Frontal 16 Key 01-04-14	83.	CW	4	502.5	3.74	1.87	-0.20	41.61	0.8849	36.26
Head Face Frontal 16 Key 01-04-14	84.	CW	5	511.9	3.59	1.80	-0.12	41.47	0.8941	36.24
Head Face Frontal 4 Key 01-04-14	85.	CW	2	467.5	5.96	2.98	-0.19	42.36	0.8566	36.25
Head Face Frontal Low Capacity Battery 16 Key 01-04-14	86.	CW	2	467.5	5.63	2.82	-0.20	42.36	0.8566	36.26
System Check 01-04-14	87.	CW 450 MHz	1	450	1.88	N/A	-0.08	42.76	0.8418	-

Note: The uncertainty of the system (± 23.9 %) has not been added to the results.

Table: SAR MEASUREMENT RESULTS – Face frontal positions Antenna Helical

Test Position	Plot No.	Test Mode	Test Ch.	Test Freq (MHz)	Measured 1g SAR Results (mW/g)	Measured 1g SAR Results 50% Duty Cycle (mW/g)	Measured Drift (dB)	∈r (target 43.5 ±5% 41.3 to 45.7)	σ (target 0.87 ±5% 0.83 to 0.91)	Measured RF Power (dBm)
Head Face Frontal 16 Key 01-04-14	88.	CW	3	485	6.67	3.34	-0.19	42.02	0.8712	36.27
Head Face Frontal Low Capacity Battery 16 Key 01-04-14	89.	CW	3	485	5.93	2.97	-0.20	42.02	0.8712	36.26
Head Face Frontal 4 Key 01-04-14	90.	CW	3	485	6.49	3.25	-0.19	42.02	0.8712	36.25

Note: The uncertainty of the system (± 23.9 %) has not been added to the results.

8.0 COMPLIANCE STATEMENT

The Tait Push to Talk Transceiver model TPDH7A was tested on behalf of Tait Limited. It complied with the FCC SAR requirements. It also complied with IC RSS-102 requirements.
The highest Measured SAR level was 11.8 mW/g for a 1g cube. After extrapolating to a 50% duty cycle the highest SAR level recorded was 5.90 mW/g for a 1g cube. This value was measured in the "body worn" position with the Nylon Case Belt Loop (T03-00038-0017), and the helical antenna, 16 Key Variant in RF Channel 1.

The measured conducted power in the channel one during above test was 36.27 dBm or 4.24W. The manufacturer's maximum tune-up power is stated to be 4.24 W. Scaling to maximum tune up tolerance value was not required, the maximum **Reported SAR value is 5.90mW/g**, and it was below the controlled limit of 8.0 mW/g, even taking into account the measurement uncertainty of 23.9 %. Variability check was performed for the worst case SAR in Body Worn configuration for Helical and Whip antennas respectively, and the repeated results were within ±5% from initial scans, no further Variability checks were required.